PHYTOTOXICOLOGY ASSESSMENT SURVEY IN THE VICINITY OF BRAMPTON BRICK LTD., 225 WANLESS DR., BRAMPTON, 1991

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PHYTOTOXICOLOGY ASSESSMENT SURVEY

IN THE VICINITY OF BRAMPTON BRICK LTD.,

225 WANLESS DR., NEAR SNELGROVE - 1991

ARB 193-91-PHYTO

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Phytotoxicology Vegetation Assessment Survey in the Vicinity of Brampton Brick Ltd., 225 Wanless Drive, Brampton - 1991

Background

On August 19, 1991, a Phytotoxicology assessment survey was conducted in the vicinity of the new production facility of Brampton Brick at 225 Wanless Drive, near Snelgrove. The new brick production facility opened in 1988, but did not become fully operational until 1989. A pre-operational survey was conducted in 1987, followed by post-operational (fluoride) surveys in 1989 and 1990. The surveys were requested by the MOE Central Region. The results of earlier surveys have been previously reported (refs. 1 & 2).

Sampling and Inspections

On August 19, 1991, foliage was collected from the exposed side of the seven maple tree sites that were established in 1990. Forage collection was discontinued at the six forage sites that were sampled in previous years. From each maple site, duplicate samples of foliage were collected using standard sampling procedures. In addition to foliage sampling, maple trees and other vegetation growing in the survey area were inspected for foliar fluoride injury.

The foliage samples were returned to the Phytotoxicology Section Processing Laboratory. The samples were oven dried, ground and stored in glass jars. They were then submitted to the MOE Laboratory Services Branch for analysis of fluoride.

Observations

In 1991, fluoride-type foliar injury of light severity overall was observed on St. John's Wort plants (as in 1990) that were growing between Sites 1 and 2 in the vicinity of the railroad just west of the brickwork. A wild grape patch between these sites also exhibited some leaves with trace (>0-1 %) to light (2-10 %) fluoride-type injury. Inspections elsewhere in the survey area did not reveal any foliar injury attributable to fluoride emissions.

Analytical Results

In Table 1, the maple foliage results for 1991 are compared with the 1990 data and with the Phytotoxicology Upper Limit of Normal (ULN) rural and urban guidelines. The rural ULN is considered more applicable than the urban ULN as farming is still being carried out to the north and west of the brickworks.

The highest fluoride concentrations in maple foliage, as in 1990, were detected at Site 2 (82 ppm), to the immediate south of the brickworks. Fluoride at this site was moderately elevated, but at Sites 1, 5 and 6 (see map), there was only marginal elevation, compared to the rural ULN (15 ppm). Sites 1 and 2, with 38 and 82 ppm fluoride respectively, were the only sites to exceed the urban ULN (35 ppm), compared to only Site 2 in 1990. Foliar fluoride concentrations throughout the survey area in 1991, though slightly higher than in 1990, were similar to the corresponding 1990 results.

The recent 1990/1991 maple foliage data, together with the 1987 to 1990 forage results (Table 2), show that the new Brar pton Brick plant is a fluoride source. However, vegetation surveys through 1991 have revealed consistent but marginal fluoride exceedances of the rural ULN at most tree foliage/forage sites, and fluoride-type injury on only two of the most sensitive plant species to the immediate west of the plant. These findings indicate that this brick production facility is a relatively minor source of fluoride emissions.

Summary

In summary, the 1991 investigation results, similar to previous years, indicated that Brampton Brick's new brick production facility at 225 Wanless Drive near Snelgrove is a fluoride source. However, the analytical results and observations to date indicate that this brickworks is a relatively minor source of fluoride emissions.

References Cited:

1) MOE Report ARB-119-90-Phyto: Phytotoxicology Section Investigations in the Vicinity of Brampton Brick Ltd., 514 Main St. N., Brampton, 1989 and Brampton Brick Ltd., 225 Wanless Dr., Brampton, 1987 and 1989.

2) MOE Report ARB-067-91-Phyto: Phytotoxicology Assessment Surveys in the Vicinity of the Brampton Brick Ltd. Brickworks at 225 Wanless Dr., and 514 Main St. N., Brampton -1990

Table 1
Fluoride Concentrations in Maple Foliage in the Area of Brampton Brick, 225 Wanless Dr., Near Snelgrove - 1991 & 1990

Site No.	Maple Species	Concentration* (ppm, dry wt.)	
		1991	1990
1	Silver Maple	<u>38</u>	<u>20</u>
2	Silver Maple	<u>82</u>	<u>73</u>
5	Silver Maple	<u>23</u>	<u>21</u>
6	Manitoba Maple	<u>29</u>	<u>19</u>
7	Silver Maple	15	7
8	Silver Maple	8	5
9	Sugar Maple	5	4
Rural ULN**		**15**	
Urban ULN**		**35**	

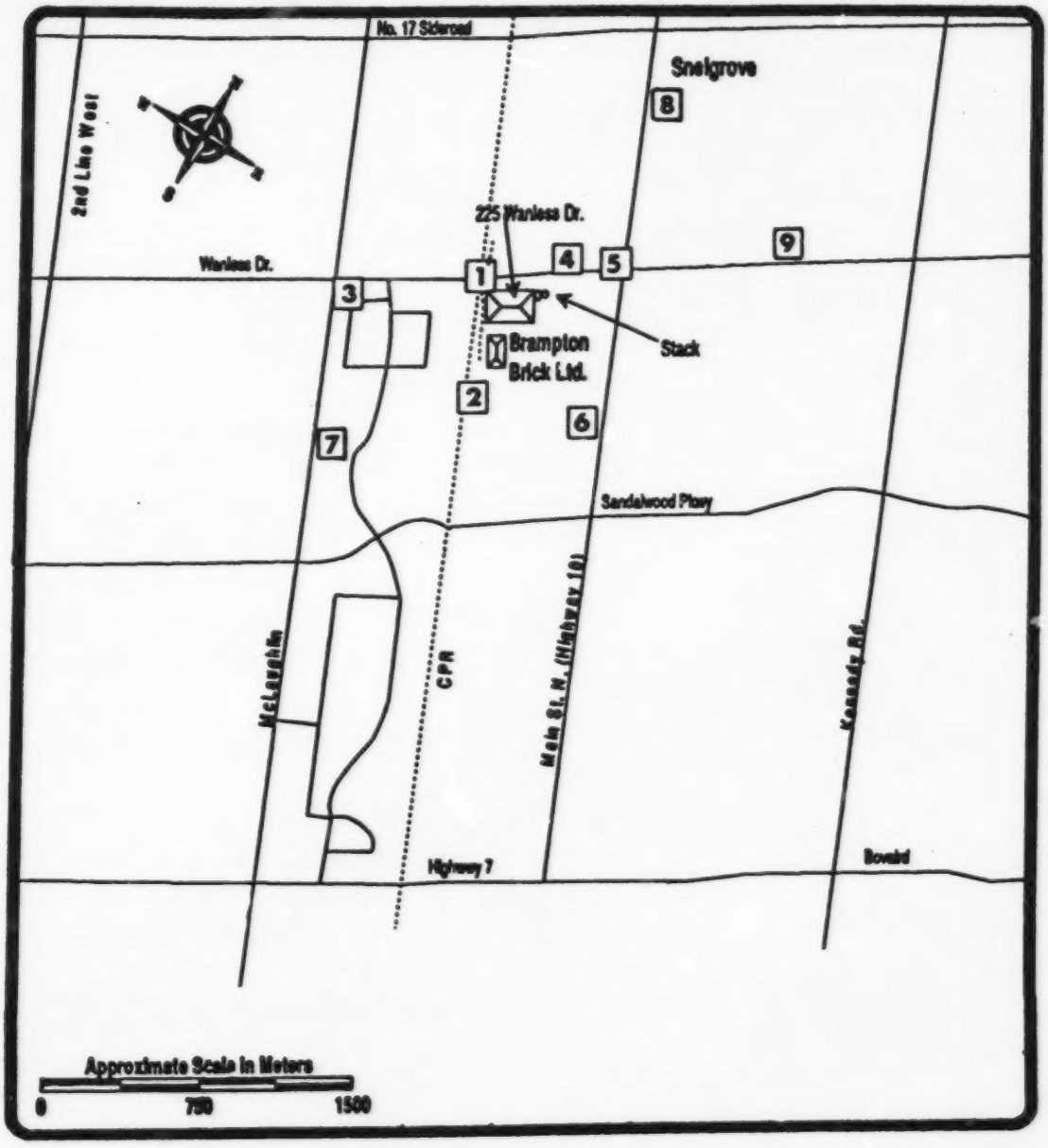
* Average of duplicate results
** Phytotoxicology Section Upper Limit of Normal (ULN) guidelines, see appendix. Results underlined exceed rural ULN

Table 2
Fluoride Concentrations in Forage in the Area of Brampton Brick., 225 Wanless Drive, Near Snelgrove - 1987 to 1990***

Site No.	Average Concentration* (ppm, dry wt)			
	November **1987**	October **1989**	August **1990**	September **1990**
1	6	10	5	12
2	5	11	12	**20**
3	6	11	2	5
4	5	**19**	5	**19**
5	6	12	7	9
6	NS	**15**	5	8
Rural ULN**	**12**			

* Average of duplicate replicate results
** Phytotoxicology Section Upper Limit of Normal rural guideline, see appendix. An urban ULN has not been established. Results underlined exceed rural ULN
*** Results of forage collections from 1987 to 1990. Forage was not collected in 1991

Sketch Map Showing Approximate Sampling Locations in the Vicinity of Brampton Brick Limited., 225 Wanless Drive, Near Snelgrove - 1991 and 1990



Appendix

Derivation and Significance of the MOE Phytotoxicology "Upper Limits of Normal" Contaminant Guidelines.

The MOE Upper Limits of Normal (ULN) contaminant guidelines represent the expected maximum concentration in surface soil, foliage (trees and shrubs), grass, moss bags, and snow from areas in Ontario not exposed to the influence of a point source of pollution. Urban ULN guidelines are based on samples collected from developed urban centres, whereas rural ULN guidelines were developed from non-urbanized areas. Samples were collected by Phytotoxicology staff using standard sampling procedures (ref: Ontario Ministry of the Environment 1983, *Phytotoxicology Field Investigation Manual*). Chemical analyses were conducted by the MOE Laboratory Services Branch.

The ULN is the arithmetic mean, plus three standard deviations of the mean, of the suitable background data. This represents 99% of the sample population. This means that for every 100 samples which have not been exposed to a point source of pollution, 99 will fall within the ULN.

The ULNs do not represent maximum desirable or allowable limits. Rather, they are an indication that concentrations that exceed the ULN may be the result of contamination from a pollution source. Concentrations that exceed the ULNs are not necessarily toxic to plants, animals, or people. Concentrations that are below the ULNs are not known to be toxic.

ULNs are not available for all elements. This is because some elements have a very large range in the natural environment and the ULN, calculated as the mean plus three standard deviations, would be unrealistically high. Also, for some elements, insufficient background data is available to confidently calculate ULNs. The MOE Phytotoxicology ULNs are constantly being reviewed as the background environmental data base is expanded. This will result in more ULNs being established and may amend existing ULNs.